

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

REPORT OF INVESTIGATION

Surface Nonmetal Mine
(Granite)

Fatal Machinery Accident

September 26, 2003

Tire Centers, LLC (B996)
Duncan, Spartanburg County, South Carolina

Paramont Grading Company Inc. (3MH)
Cummings, Forsyth County, Georgia

At
Sandy Flat Quarry
Hanson Aggregates, Southeast, Inc.
Greer, Greenville County South Carolina
Mine I.D. No. 38-00310

Investigators

Larry R. Nichols
Supervisory Mine Safety and Health Inspector

Robert C. McPheeters
Mine Safety and Health Inspector

Ronald Medina
Mechanical Engineer

James M. Hackworth
Mine Safety and Health Specialist

Originating Office
Mine Safety and Health Administration
Southeast District
135 Gemini Circle, Suite 212; Birmingham, AL 35209
Michael A. Davis, District Manager

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OVERVIEW

Carl K. Hall, contract tire service technician, age 38, was fatally injured on September 26, 2003, when a tire slipped from the gripping pads of a truck-mounted tire handling crane and struck him. Hall had used the crane to position one tire vertically against the front tire of a haul truck. He was attempting to place the second tire against the first tire he had positioned when the accident occurred.

The accident occurred because the tire was not secured by the gripping pads, allowing it to fall, pinning the victim against the service truck. Hall parked his service truck close to the haul truck and was positioned in the constricted area between the two trucks.

GENERAL INFORMATION

The Sandy Flat Quarry, a crushed granite operation, owned and operated by Hanson Aggregates Southeast, Inc. (Hanson), was located off Keller Road, seven miles northwest of Greer, Greenville County, South Carolina. The principal operating official was Johnny Clements, plant manager. The mine operated one, 10-hour shift, 5 days a week. Total employment was 33 persons.

Paramont Grading Company, Incorporated (Paramont) was contracted by Hanson to strip the overburden. Paramont was located at 4405 Canton Highway, Cummings, Forsyth County, Georgia. The principal operating official was Nelson Younce, foreman. The contractor worked one, 10-hour shift a day, 5 days a week. Total employment was seven persons.

Hall was employed by Tire Centers LLC, located at 310 Inglesby Parkway, Duncan, Spartanburg County, South Carolina. Tire Centers LLC was subcontracted by Paramont to repair and replace tires at the mine site as needed. The principal operating official was Terry Blackwell, safety and loss prevention manager. Hall was the only maintenance employee working at the site for Tire Centers LLC on the day of the accident.

The Sandy Flat Quarry was a multiple bench mine with an associated mill. Contractors were used in stripping operations, road relocations, and some equipment repairs. The material was drilled and blasted, transported by truck to the crusher where it was screened, crushed, washed, sized, and stockpiled. The final product was sold for use in the construction industry.

The last regular inspection of this operation was completed May 15, 2003.

DESCRIPTION OF ACCIDENT

On the day of the accident, Carl K. Hall (victim) arrived at the mine site at approximately 9:30 a.m. and met with Nelson Younce, foreman for Paramount, to discuss the tire repairs that Hall was to complete. Hall drove his service truck to an active mining area on the west side of Keller Road where he met Kevin Shealy, contract mechanic with L. B. Smith Incorporated. L. B. Smith was contracted by Paramount to do maintenance and repairs on heavy equipment at the mine site. Hall and Shealy repaired truck tires until around 12:00 noon.

After lunch, they went to the maintenance and parking area on the east side of Keller Road to repair tires on a Euclid R50 truck. The two left rear tires had been removed from the haul truck two days earlier so the brakes could be repaired. Shealy wanted to weld valve stem locaters on the rim of the inside tire to prevent slippage on the hub that could cause damage to the valve stem after the tire was remounted.

Hall and Shealy deflated the tire and loosened the locking ring. Hall used the service truck crane to pick up the tire and rim and held the tire by the gripping pads in a vertical position, with the bottom of the tire resting on the ground. After Shealy welded the metal valve stem locaters on the tire rim, he asked Hall to reposition the two tires so he could reinstall them after the brakes were repaired on the truck. The two tires were to be placed against the left front tire of the haul truck so Shealy could put a chain around the tires and lift them when they were ready to be remounted. Shealy then left the area.

After the tire rim cooled, Hall installed a valve stem extension, reinstalled the locking ring, and inflated the tire to 70 psi. He moved the service truck and repositioned it, parking parallel and even with the haul truck, approximately 11 feet away and slightly down hill. Using the crane, he picked up the tire and positioned it so that it was leaning against the front left tire of the haul truck. The bottom of the tire was about 3 feet from the truck, leaving a space of about 8 feet between the trucks where Hall was positioned at the controls for the crane. As Hall attempted to place the second tire against the first tire, the tire slipped from the gripping pads, hit the ground, bounced, and pinned him against the service truck.

At about 1:30 p.m., Younce went to the parking area to park a water truck and found Hall. He checked for vital signs but Hall was nonresponsive. Younce immediately notified other mine personnel to call for emergency assistance. Local emergency personnel arrived and pronounced Hall dead at the scene.

INVESTIGATION OF THE ACCIDENT

MSHA was notified of the accident at 2:00 p.m., on September 26, 2003, by a telephone call from Dennis N. Dzvonik, safety coordinator for Hanson, to Ricky J. Horn, supervisory mine safety and health inspector. An investigation was started that day. An order was issued under the provisions of Section 103(k) of the Mine Act to ensure the safety of the miners. MSHA's accident investigators traveled to the mine, made a physical inspection of the accident scene, interviewed employees, and reviewed conditions and work

procedures relevant to the accident. MSHA conducted the investigation with the assistance of mine management and employees.

DISCUSSION

Location of the Accident

The accident occurred at the maintenance and parking area maintained by Paramount, located on the east side of Keller Road. The area was a dirt, grassy surface with an approximate eight percent grade. At the time of the accident, the service truck and the haul truck were the only vehicles parked in the area.

Position of the Service Truck

The service truck was found with the outriggers down. The tire positioning arms were found 80 inches apart, tooth to tooth, and the bottom of the gripper pads were found 75 inches above ground level with the arms pointing down.

The service truck was parked 11 feet from the haul truck. The first tire was positioned so that the bottom of the tire rested 3 feet from the tire on the haul truck. This provided only 8 feet of space for Hall to move the second tire as he stood at the controls on the side of the truck.

Service Truck and Crane

The service truck was manufactured by Ford and was equipped with a Caterpillar model 3126, 7.3 liter, turbocharged diesel engine. It had a gross vehicle weight rating of 33,000 pounds. A Fleet Equipment Corporation (FEC) model 3216 crane with a FEC model TP11 Tire Positioner attachment was mounted on the truck bed.

The crane boom was mounted on a rotating base. The boom could swing to either side of the truck and could be raised and lowered. Two sections, hinged together, enabled the boom to articulate around the hinge point.

The gripper-type tire positioner attachment was connected to the end of the boom with a second hinged connection that enabled it to tilt. The attachment had two clamping arms with steel gripper pads on the ends. The gripper pads were 24 inches long and 13 inches wide with a series of 1½ inch triangular teeth to grip the tire. The clamping force of the tire positioner was provided by two hydraulic cylinders with a 3-inch bore and 33-inch stroke. The distance between the arms could be adjusted from 60¼ inches to 126¼ inches. The tire positioner assembly could be rotated. The gripper pads were fixed and did not rotate. All the functions were controlled hydraulically, using either hydraulic cylinders or hydraulic motors.

The load chart for the tire handling crane indicated a maximum rated capacity of 10,200 pounds to 16,000 pounds, depending on the distance from the base of the crane.

Tire Involved in the Accident

The tire that struck the victim was a 24.00-35 E4 Firestone HD Super Rock Grip, tubeless, off-highway tire, mounted on a demountable rim. It was approximately 82 inches in diameter, and 24 inches wide. The inflation pressure was 70 psi. Total weight of the rim and tire was approximately 2,200 pounds.

Operating Control Design

The crane and tire positioner attachment could be operated from either of two control stations, one on the left side of the truck and a duplicate control station on the right side.

These control stations were located just behind the truck's cab and could be operated from the ground. There were eight manual hydraulic control handles at each end of the two control stations, arranged in a vertical stack. The duplicate control lever pairs were mechanically linked together so that if a control on one side of the truck was actuated, the other side of the machine followed. The hydraulic valve bank was located on the left side of the truck. Both sets of controls operated this valve bank. A pressure gauge was located at the bottom of the valve bank. The control handles returned to the neutral position by spring force when released. The control handles were labeled on an adjacent plate installed by the crane manufacturer.

The hydraulic clamping cylinders, outrigger cylinders, and extension link cylinder were provided with pilot operated load locking check valves. The cylinders that raised and lowered the boom arm sections were provided with counterbalance load locking valves.

Testing of Operating Controls

During the investigation, the outriggers were lowered to the ground and each of the tire handling controls was operated with no load in the tire positioner. Two of the controls were found to be reversed with respect to how they were labeled, because the hydraulic hoses connected to the tire positioner attachment were installed incorrectly. When the control labeled "Clamp Tire Positioner" was moved, the tire positioner attachment rotated. When the control labeled "Rotate Tire Positioner" was actuated, the tire positioner arms opened or closed.

Reportedly, Hall knew that the two controls were reversed and had been operating the crane that way for several months. Tim Wilson, a former employee of Tire Centers, LLC, stated that he and Hall installed the tire positioner attachment several months earlier. When they finished the installation, they realized that the clamp and rotate controls had been reversed. Wilson stated that Hall intended to correct the hydraulic hose connections at a later date.

Initial testing showed that the existing pressure gauge installed at the bottom of the valve bank indicated a maximum pressure of only 650 psi when the controls were fully actuated against relief. The maximum rated operating pressure of the tire handling crane was 2,400 to 2,500 psi. The cause of the low reading was found to be a defective pressure gauge. When the gauge was replaced, there was 2,400 psi of pressure when either of the controls was fully actuated. Since the full operational pressure readings for the two controls were identical, the reversed hosing would not have affected the clamping force of the tire handling arms. The relief pressure settings for the other controls were also within the rated operating range specified by the manufacturer.

The tire handling crane was operated throughout its operational limits while handling the same tire involved in the accident. Except for the two reversed controls, there were no signs of irregular motion or other defects. When any of the control handles were released, the handle returned to the center-neutral position and the corresponding machine motion stopped. The tire involved in the accident was lifted off the ground and the operator removed his hands from the controls. For this controlled test, the tire positioning arms were pointing down and the tire was held horizontally (parallel with the ground). Throughout a five minute period, no drift was noted and the clamping arms maintained the gripping pressure on the tire. The outriggers maintained pressure against the ground throughout the testing.

“Feathering”

Some tire technicians perform a maneuver called “feathering”. This is where the operator loosens the gripping force on the tire to allow it to be rotated within the gripping pads, if pressure is applied against another object. Hall may have loosened the pressure on the gripping pads to rotate the tire, attempting to position it against the other tire.

Weather

Weather on the day of the accident was clear and dry with a slight wind from the Southeast.

Training and Experience

Hall had a total of 17 years, 11 months total experience as an over-the-road tire service technician, 2 years, 6½ months mining experience. This was his first day at the mine site. Hall had received required training in accordance with 30 CFR, Part 46.

ROOT CAUSE ANALYSIS

A root cause analysis was conducted and the following causal factors were identified:

Causal Factor: After positioning the first tire, there was limited space between the two trucks for the employee to move the second tire. The service truck was parked 11 feet from the haul truck. The first tire was positioned so that it rested 3 feet from the tire on the haul truck. This provided only 8 feet of space for Hall to move the second tire as he stood at the controls for the crane on the side of the truck, placing him in close proximity to the suspended tire he was moving.

Corrective Action: Procedures should be established that assess the job being performed and the associated hazards. Moving the service truck further from the haul truck after the first tire had been positioned would have provided Hall more space to work in and would not have positioned him so close to the second tire.

Causal Factor: The tire fell because it was not secured by the gripping pads while it was being moved.

Corrective Action: Procedures should be established that require loads to be securely attached to hoisting equipment. The gripping force on the tires should not be loosened

to allow the tire to be rotated while it is suspended in the gripping pads. Work procedures should be discussed and hazards associated with the task to be performed should be identified. Measures should be implemented to ensure persons are properly protected.

Causal Factor: A risk assessment to determine possible hazards and establish safe work procedures was not conducted prior to the tires being moved.

Corrective Action: Employees should be trained and knowledgeable of the procedures involved in conducting a task risk assessment. Procedures should be established that require risk assessments to be conducted that identify potential hazardous conditions. Any hazards identified should be corrected prior to performing the task.

CONCLUSION

The accident occurred because the tire was not secured by the gripping pads, allowing it to fall, pinning the victim against the service truck. Hall parked his service truck close to the haul truck and was working in a constricted area. He may have loosened the pressure on the gripping pads while the tire was suspended in order to rotate the tire, attempting to position it against the tire that was leaning against the haul truck.

VIOLATIONS

Hanson Aggregates Southeast, Inc.

Order No. 6120745 was issued on September 26, 2003, under the provisions of Section 103(k) of the Mine Act:

A fatal accident occurred at this operation on September 26, 2003, when a contract miner was attempting to position a rear tire for a Euclid R-50 haulage truck. This order is issued to assure the safety of persons at this operation. It prohibits all activities at the location where the two vehicles are located until MSHA determines that it is safe to resume normal operations in the area. The mine operator shall obtain prior approval from an authorized representative for all actions to recover and/or restore operations in the affected area.

This order was terminated on September 29, 2003. Conditions that contributed to the accident have been corrected and normal mining operations can resume.

Tire Centers LLC

Citation No. 6120748 was issued on October 23, 2003, under the provisions of Section

104(a) of the Mine Act for violation of 30 CFR 56.16009:

A contract tire technician was fatally injured at this operation on September 26, 2003, when a tire slipped from the gripping pads of a truck-mounted tire handling crane. The employee was using the crane to place two tires in an upright position against the front tire of a 50 ton Euclid haul truck. As he moved the second tire into position, it fell from the gripping pads, pinning him between the tire and service truck.

This citation was terminated on October 24, 2003. Employees have been retrained in safe tire installation, tire positioning, and working near suspended loads.

Approved by: _____ Date: _____
Michael A. Davis
District Manager

APPENDIXES

- A. Persons Participating in the Investigation
- B. Persons Interviewed

APPENDIX A

Persons Participating in the Investigation

Hanson Aggregates Southeast, Inc.

Tom Bugenhagen area vice president
Dennis N. Dzvonik safety coordinator
Johnny Clements plant manager

Tire Centers LLC

Terry Blackwell safety and loss prevention manager
Neil Wilson fleet/tire consultant
Lebron Durham service manager
John Eason OTR technician
Tim Wilson former employee

Hansworth Baldwin Johnson and Graves LLC

David R. Wylie attorney

Paramont Grading Company, Inc.

Greg Bettis safety compliance
Nelson Younce foreman

Smith, Currie and Hancock LLP

Karie D. Davis attorney

Greenville County Sheriff's Office

Wes Smith investigator

Mine Safety and Health Administration

Larry R. Nichols supervisory mine safety and health inspector
Robert C. McPheeters mine safety and health inspector
Ronald Medina mechanical engineer
James M. Hackworth mine safety and health specialist

APPENDIX B

Persons Interviewed

Hanson Aggregates Southeast, Inc.

Johnny Clements plant manager

Tire Centers LLC

Terry Blackwell safety and loss prevention manager

Neil Wilson fleet/tire consultant

Tim Wilson former employee

L. B. Smith, Inc.

Kevin Shealy service technician

Paramont Grading Company, Inc.

Greg Bettis safety compliance

Nelson Younce foreman